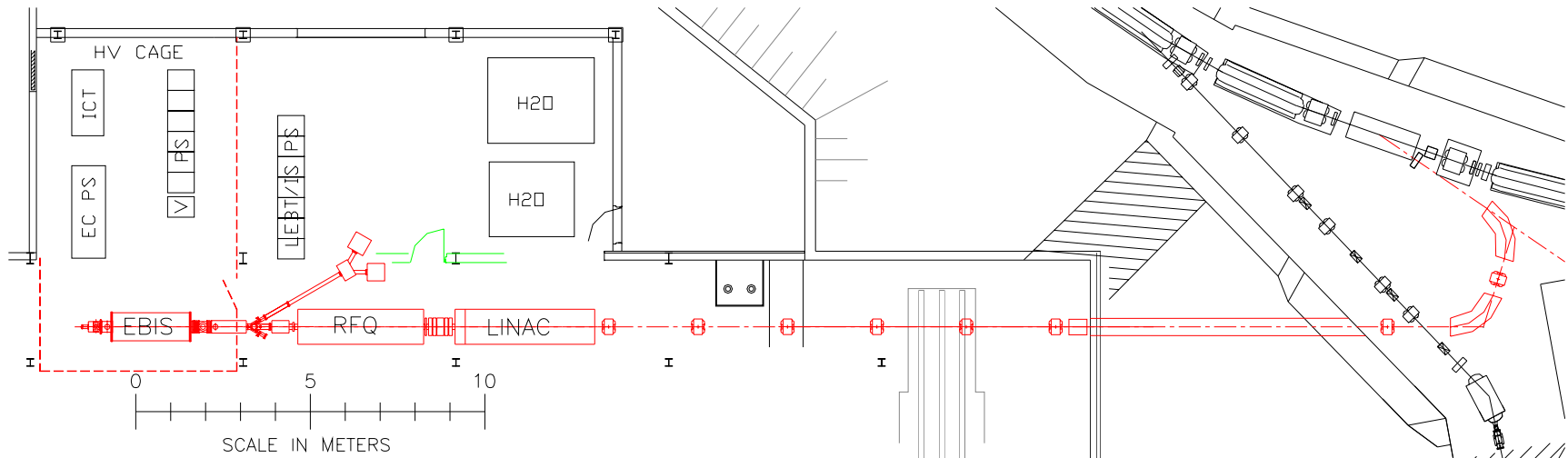


WBS 1.4 Magnet Systems

John Ritter

July 25-27, 2005

WBS 1.4 Magnet Systems



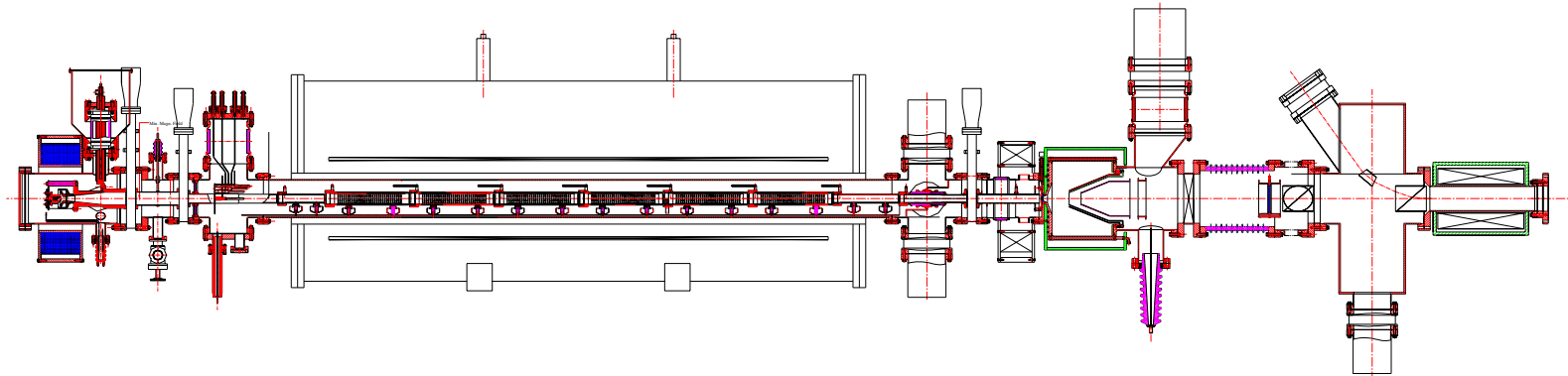
1.4.1 EBIS Warm Solenoids

1.4.2 MEBT Quadrupoles

1.4.3 HEBT Dipoles

1.4.4 HEBT Quadrupoles

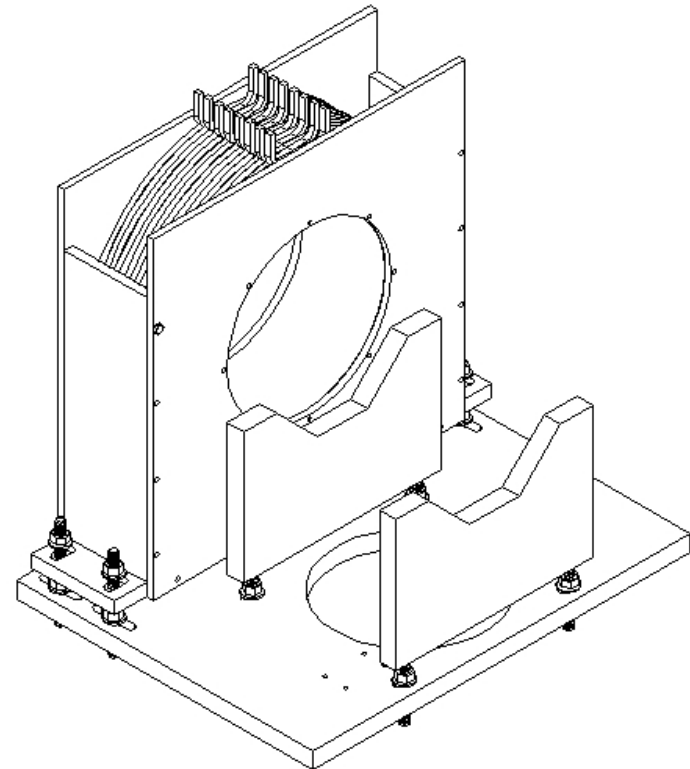
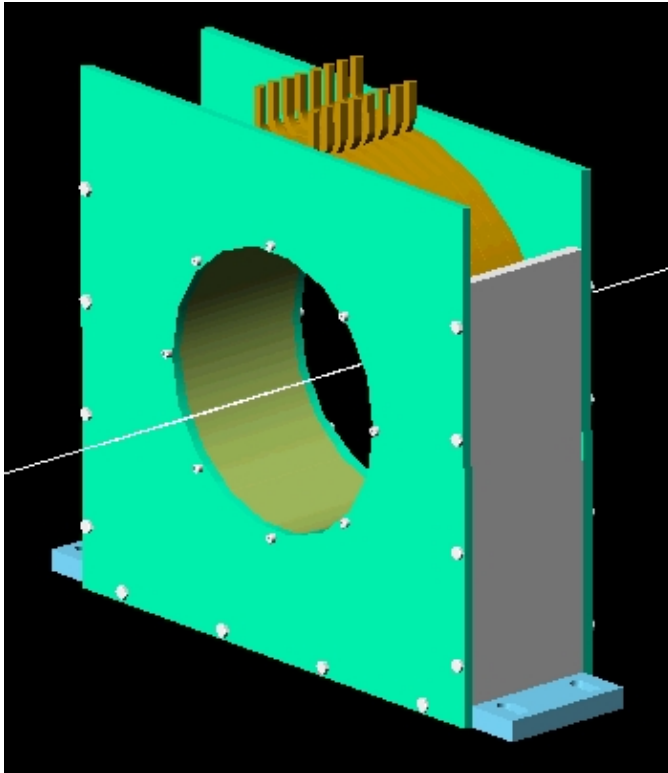
WBS 1.4.1 Warm Solenoids



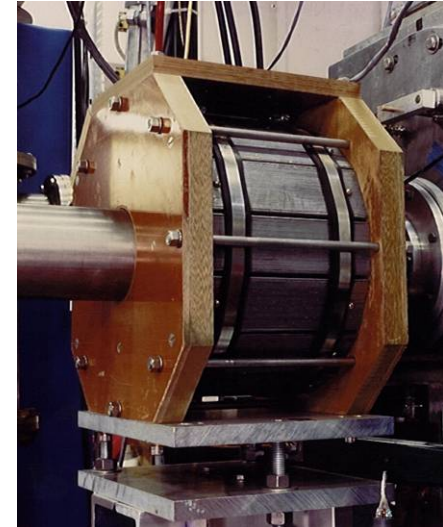
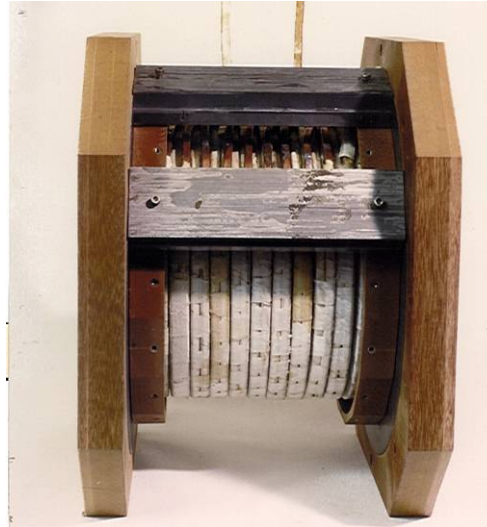
	Length	Aperture	Gradient	Field
Electron Gun Solenoid	15.3 cm	25.4 cm	1.4 T/m	.22 T
Electron Collector Solenoid	12.7 cm	25.4 cm	1.2 T/m	.15 T
EBIS LEPT Solenoid	24.1 cm	10.2 cm	5.2 T/m	1.25 T

WBS 1.4.1 Warm Solenoids

Electron Gun Solenoid and Collector Solenoid similar in design to existing solenoids installed on Test EBIS.



WBS 1.4.1 Warm Solenoids



Design of EBIS LEBT Solenoid similar to Existing LEBT Solenoid (H- LINAC) design.

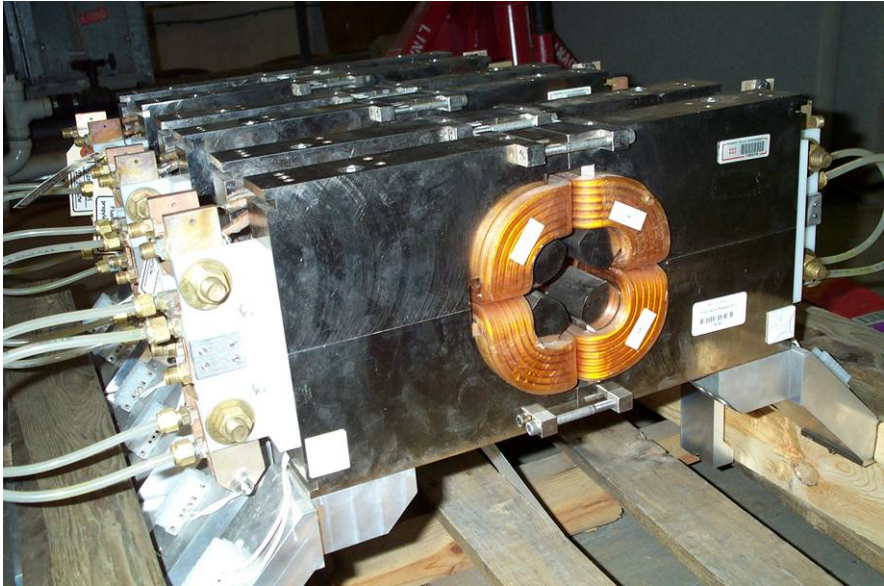
Material/Procurements (Direct '05\$)

Laminations for LEBT Solenoid	\$10K
Coil Material	\$9K
Magnet support/mount	\$12K
Magnet Components	\$30K

Estimate based on magnets built for EBIS and LINAC.

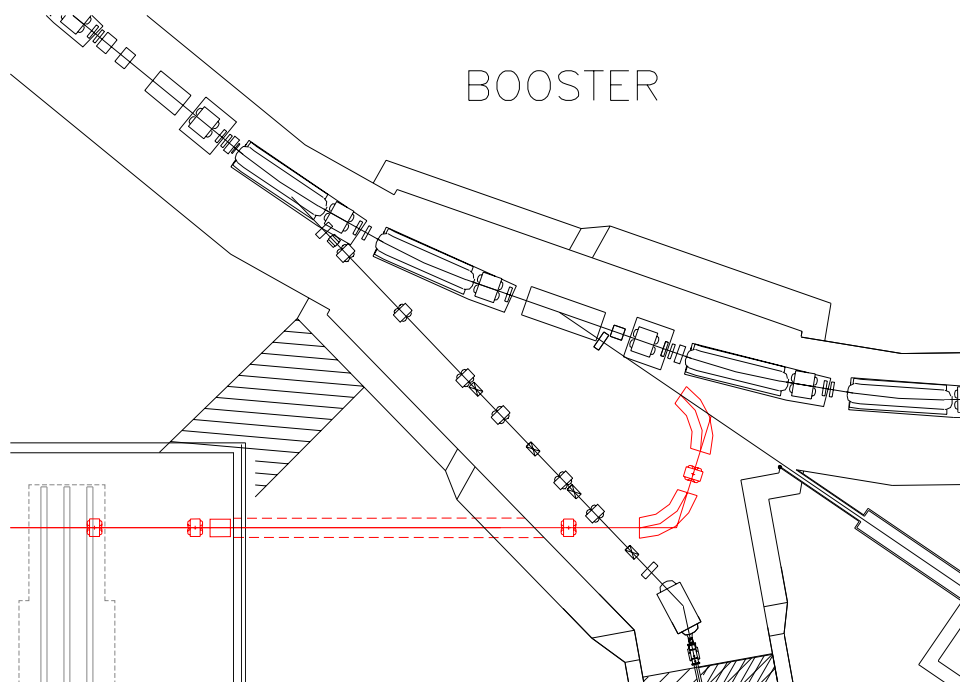


WBS 1.4.2 MEBT Quadrupoles



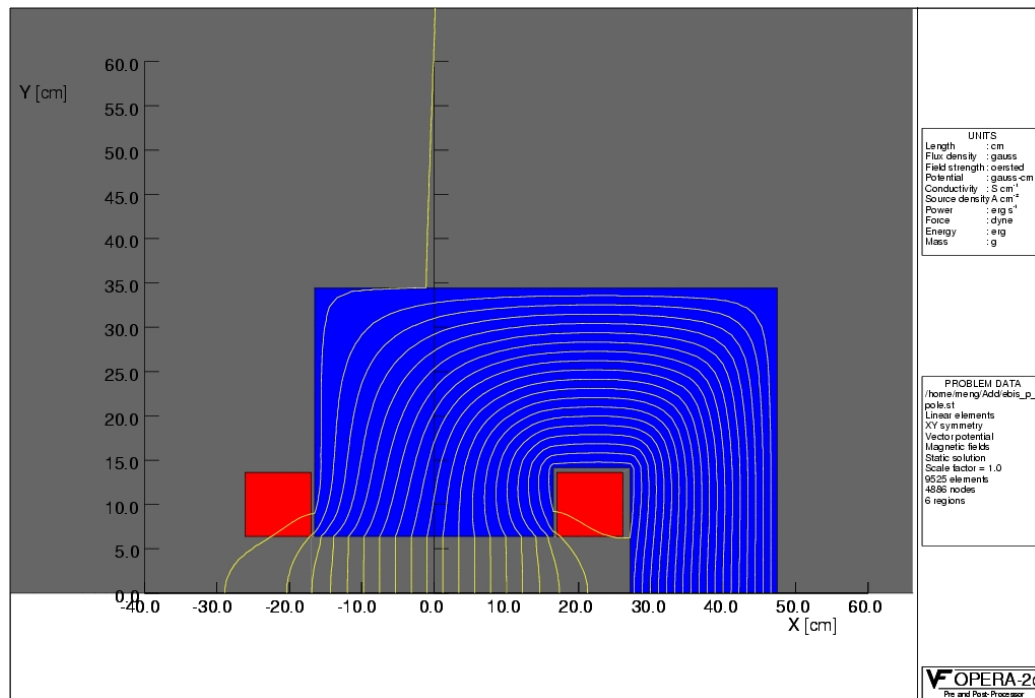
45 mm-long pole LANL Quads are available at BNL.
Estimate includes support system of magnets and necessary water manifolds.

WBS 1.4.3 HEBT Dipoles



Bend Angle 73°
Gap 12.7 cm
Radius 128 cm
Field 1.1T
Pulse Rate 1 Hz
Turns per coil 20
2 coils/magnet
Current 2780A @ 1.1T
Power 29.6 KW/magnet
Voltage 10.65 V
Maximum Current
3285@1.3T
Maximum Power 41.4 KW
Maximum Voltage 12.59 V

WBS 1.4.3 HEBT Dipoles



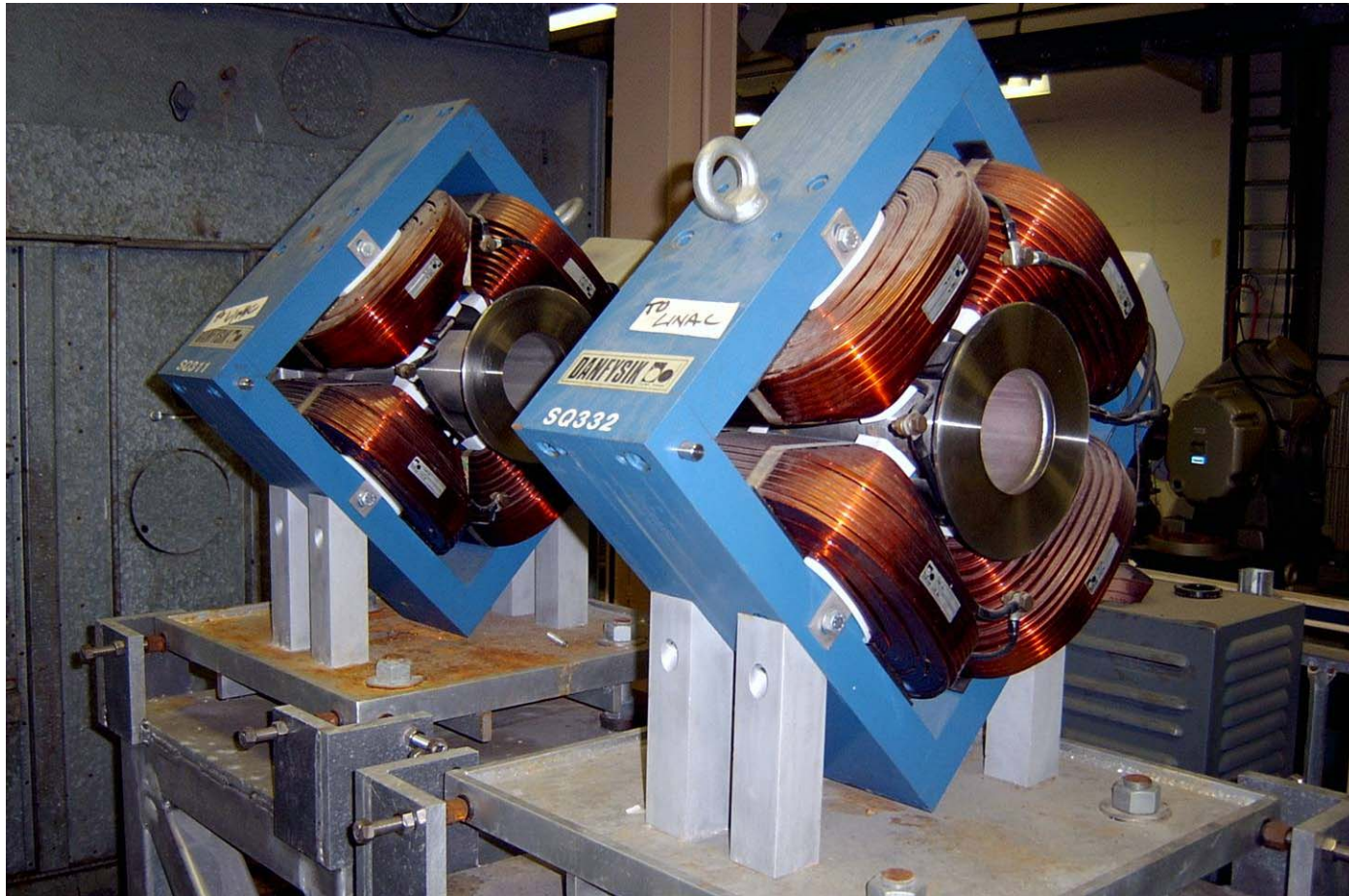
Material/Procurements (Direct '05\$)

Laminations	\$126K
Coils	\$57K
Magnet Stands	\$20K
Jacks	\$3.6K
Bus Terminations	\$8K
Water Manifolds	\$4K

Major items in estimate are coil and lamination cost. Cost based on prior magnet purchases at BNL.

Steel Laminations	\$7.98 / lb.
Wound Coils	\$17.98 / lb.

WBS 1.4.4 HEBT Quadrupoles



Air-Cooled Quads and magnet stands available at BNL

WBS 1.4 Magnet Systems

- Major procurements: (Direct '05 Cost)

1.4.1 Warm Solenoids	\$61K
1.4.2 MEBT Quads	\$12K
1.4.3 HEBT Dipoles (2)	\$219K
1.4.4 HEBT Quads	N/A

- Risks:

Increase in foreign currency exchange rates

Drastic increase in price of raw materials

Vendor delays affecting schedule

WBS 1.4 Magnet Systems

- Estimated Cost

WBS	Description	Direct FY'05K\$			
		Mat'l	Labor	Contingency	Total
1.4	Magnets	295	155	\$95 (21%)	545

- Labor hours/equivalents

Resource Category	estimated hours
Scientist	325
Engineer	875
Designer	450
Technician	600
Building Trades	50
Total	2,300
Full Time Equivalents	1.3